

# Three Dimensional Volumetric Terahertz Scanning for Aerospace Non Destructive Evaluation, Phase II

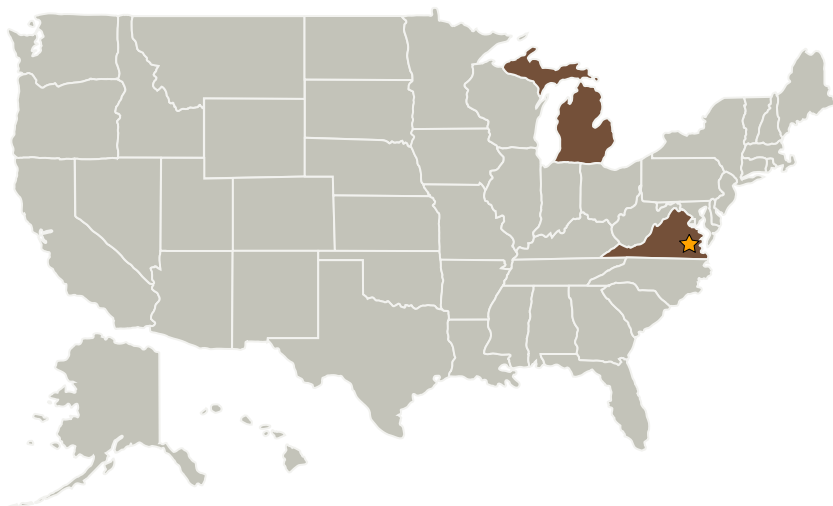
Completed Technology Project (2005 - 2007)



## Project Introduction

NASA and the aerospace industry are beginning to utilize terahertz (THz) reflection imaging (for example, examining the space shuttle external tank sprayed on foam insulation for voids and disbonds). THz non destructive evaluation (NDE) imaging is widely applicable to composite resin, ceramic, plastic, natural, and other non-metallic materials. Current commercial equipment is capable of 2D raster scanning, collecting THz waveforms from a very narrow depth range. THz NDE technology can be more fully exploited if high speed 3D THz imaging is realized. Phase II work will enable objects many inches thick to be imaged in 3D an order of magnitude faster than current 2D imaging configurations. We will develop and demonstrate the following innovative imaging methodologies for high speed, high sensitivity 3D NDE imaging: 1) Improved 3-dimensional THz Synthetic Aperture Radar (SAR) and Background-free THz SAR (rapid imaging); 2) Travel-time 3D Reflection THz tomography (high resolution 3D structure); and 3) Interferometric THz time-of-flight bulk imaging (greater sensitivity to small voids and disbonds). We will enhance our Phase I tomographic testbed, construct an improved high resolution co-linear reflection transceiver, modify the transceiver for interferometry, and deliver a software suite of imaging algorithms for the T-Ray 2000 THz NDE platform.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Picometrix, LLC	Supporting Organization	Industry	Ann Arbor, Michigan

Primary U.S. Work Locations	
Michigan	Virginia

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

## Technology Areas

### Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.4 Manufacturing
    - └ TX12.4.6 Repurpose Processes